DOCUMENT RESUME

ED 090 031 SE 017 613

AUTHOR Basnett, Fred D.
TITLE Ecology of Terrestrial Species of South Florida, Science (Experimental): 5365.62.
INSTITUTION Dade County Public Schools, Miami, Fla.
PUB DATE 72
NOTE 22p.; An Authorized Course of Instruction for the Quinmester Program

EDRS PRICE MF-$0.75 HC-$1.50 PLUS POSTAGE
DESCRIPTORS *Behavioral Objectives; Biology; *Ecology; Instruction; *Instructional Materials; Science Education; *Secondary School Science; *Teaching Guides; Units of Study (Subject Fields)
IDENTIFIERS *Quinmester Program

ABSTRACT

This unit of instruction is designed for the student interested in understanding the actions and interactions of plants and animals located in the South Florida environment and its many unique features such as the everglades and the seashore. It presents an in-depth study of a hardwood hammock, pine and palmetto community, sea strand community, and a grassland prairie. Limiting factors and research techniques are also examined. The booklet lists the relevant state-adopted texts and states the performance objectives for the unit. It provides an outline of the course content and suggests experiments, guest speakers, field trips, and topics for student projects, discussion questions and reports. Also listed are relevant films and filmstrips available from the Dade County Audiovisual Center. Reference books and other course materials are recommended, and a master sheet is provided relating each suggested activity to the specific performance objectives. (JR)

ED 090031

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

SE

AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

ECOLOGY OF TERRESTRIAL SPECIES OF SOUTH FLORIDA

5365.62

SCIENCE

(Experimental)

DADE COUNTY PUBLIC SCHOOLS

DIVISION OF INSTRUCTION • 1971

SE 017 6/3

ED 090031

ECOLOGY OF TERRESTRIAL SPECIES OF SOUTH FLORIDA

5365.62

SCIENCE
(Experimental)

Written by
Fred D. Basnett
for the
DIVISION OF INSTRUCTION
Dade County Public Schools
Miami, Florida
1972

DADE COUNTY SCHOOL BOARD

Mr. William Lehman, Chairman
Mr. G. Holmes Braddock, Vice-Chairman
Mrs. Ethel Beckham
Mrs. Crutcher Harrison
Mrs. Anna Brenner Meyers
Dr. Ben Sheppard
Mr. William H. Turner

Dr. E. L. Whigham, Superintendent of Schools
Dade County Public Schools
Miami, Florida 33132

Published by the Dade County School Board

Copies of this publication may be obtained through

Textbook Services
2210 S. W. Third Street
Miami, Florida 33135

TABLE OF CONTENTS

	Page
Course Description	1
Enrollment Guidelines	1
State Adopted Texts	1
Performance Objectives	2
Course Outline	3
Experiments	6
Projects	7
Reports and Discussion Questions	9
Films	11
Film Strips	13
Field Trips	14
Guest Speakers	14
References	15
Materials	17
Master Sheet	18

ECOLOGY OF TERRESTRIAL SPECIES OF SOUTH FLORIDA

COURSE DESCRIPTION

This course has been designed for the student interested in understanding the actions and interactions of plants and animals located in the South Florida environment and its many unique features such as the everglades and the seashore. It presents an in-depth study of a hardwood hammock, pine and palmetto community, sea strand community, and a grassland prairie. Limiting factors, and research techniques will be examined.

ENROLLMENT GUIDELINES

While there is no prerequisite for this course some general biology and preferably the quinmester course Introduction to the Ecology of South Florida Species would be helpful.

STATE ADOPTED TEXTS

The nature of this course demands considerable supplemental reference materials. There would be no single text to use. See Materials List for additional texts.

Biological Sciences Curriculum Study. Biological Science - An Inquiry Into Life. 2nd. ed. New York: Harcourt, Brace and World, 1968.

Biological Sciences Curriculum Study. Biological Science Molecules to Man. 2nd. ed. Boston: Houghton, Mifflin Company, 1968.

Biological Sciences Curriculum Study. High School Biology. 2nd. ed. Chicago: Rand McNally and Company, 1968.

Phillips, Edwin A. Field Ecology. Boston: D. C. Heath and Co., 1964.

PERFORMANCE OBJECTIVES

1. The student will investigate the results of the research of various scientists dealing with some aspect of ecological interpretation in South Florida.

2. Given collected information on the underlying geological strata of South Florida, the student will associate the locations of major rock strata on an outline map of Central and South Florida.

3. The student will describe in detail the central water supply of South Florida from the Kissimmee River Watershed through the Everglades National Park including the significance of man made drainage canals and the conservation "holding" areas.

4. The student will analyze results of a selected count of seedlings taken from milli-acre plots from a hardwood hammock and will include the direction of seedling growth from the central portion of the hammock.

5. Given information on plant succession to a climax community from bare rock and open water, the student will organize the biological characteristics and sequences that will occur.

6. The student will explain through the ecological "limiting factors" why a pine and palmetto community exist as such, rather than continuing to a higher type of climax community.

7. Given the description of a grassland prairie, the student will deduce which limiting factors have been in effect to allow the prairie to remain stable.

8. Given a lab experience in which immobility of protista was caused by the addition of salt water, the student will specify the limitations of certain organisms of the sea strand community.

9. The student will analyze the survival characteristics of collected flora and fauna taken directly from the sea strand community.

10. The student will be able to discuss critically, selected ecological interactions of terrestrial ecology with relationship to food chain, food webs, secondary consumers and decomposers.

COURSE OUTLINE

I. Areas of Ecological Investigation

A. Geological

1. Geological strata and distribution

2. Soil classification and distribution

3. Mineral deposits and fossil fuel distribution

B. Topographical

1. Physiographic regions

2. Plant requirements and distribution

3. Animal requirements and distribution

C. Limnological

1. Lakes

2. Rivers

3. Ponds

4. Springs

5. Swamps

D. Agricultural

1. Horticulture

2. Forestry

a. Fire influence on established populations
b. Watershed management
c. Seedling availability and distribution

3. Pollution

a. Pesticides and insect control
b. Endangered species
c. Ecological disruption

E. Meteorological

1. Temperature

a. Distribution
b. As a limiting factor
c. "Frost Free" periodicity

2. Rainfall

a. Distribution
b. As a limiting factor
c. Topographic holding factor and flow patterns

II. Research Techniques

A. Population counts and distribution

1. Insects

a. Egg cluster counts
b. Economic statistics

2. Timber

a. Forest species distribution
b. Growth rate of selected species
c. Reforestation procedures
d. Forest species disease and eradication programs

3. Vertebrates

a. Measurement of food supply
b. Disease distribution
c. Reproduction rate and cycles

III. South Florida Biomes

A. Hardwood hammock community

1. Ecological succession

2. As a climax community

a. speciation
b. endemic features

3. Stratification

4. Limiting factors

5. Periodicity

6. "Edge" effect

B. Pine and Palmetto community

1. Ecological succession

2. As a climax community

a. speciation
b. endemic features

3. Stratification

4. Limiting factors

5. Periodicity

6. "Edge" effect

C. Grassland prairie

1. Ecological succession

2. As a climax community

a. speciation
b. endemic features

3. Limiting factors

4. Infringement

D. Sea strand community

1. Limiting factors

a. salt tolerance speciation
b. specialized microniches

2. Periodicity

IV. Terrestrial Speciation Interaction

A. Liebig's "law" of the minimum

B. Shelford's "law" of tolerance

C. Energy flow in ecological systems

1. Food chain

2. Ecological efficiencies

3. Metabolism and size of individuals

4. Ecological pyramids

a. pyramid of numbers
b. pyramid of biomass
c. pyramid of energy

D. Specific limiting factors

1. Temperature

2. Radiation

3. Water

4. Temperature and moisture

5. Atmospheric gases

6. Biogenic salts

7. Currents and pressures

8. Soils

9. Fire

10. Microenvironment

EXPERIMENTS

Carter, Dr. Logan S. Experiments in Soil Science. San Luis Obispo, California: California State Polytechnical College, 1968.

1. Determing Soil Texture by Feel (exercise 5, p. 17)
2. Common Soil-Forming Rocks (exercise 2, p. 7)
3. Field Study of Local Soils (exercise 11, p. 47)
4. Determining Slope of Land (exercise 12, p. 51)
5. Infiltration Rates of Soils (exercise 14, p. 63)
6. Good Cover Increases Water Absorption (exercise 17, p. 71)
7. Infiltration Rates of Soils (exercise 14, p. 63)
8. Water Moisture Available to Plants (exercise 20, p. 81)
9. Temperature Relationships (exercise 22, p. 93)
10. Saline and Alkaline Soils (exercise 28, p. 131)
11. Soil Organisms (exercise 50, p. 223)

BSCS Blue Version Lab Manual. Boston: Houghton Mifflin Co., 1963.

12. Measurement in the Laboratory (exercise 1, p. 1)
13. Microscopic Organisms in a Laboratory Environment (exercise 7, p. 14)
14. Variation in Living Things (exercise 8, p. 17)

Phillips, Edwin A. BSCS Laboratory Block "Field Ecology". Boston: D. C. Heath and Co., 1964.

15. Mapping (exercixe IV, p. 28)
16. An Inventory (exercise V, pp. 32-72)
17. Succession (exercise VII, p. 73)

Milliken, Margaret; Hammer, Austin; McDonald, Ernest. Field Study Manual for Outdoor Learning. Minneapolis, Minn.: Burgess Publishing Co., 1968.

18. Mapping the Field Study Area (p. 7)
19. A Study of Water (pp. 39-62)

20. A Study of Animal Life (p. 105)
21. A Study of Weather (p. 105)

Carlock, John R., Moore, Harold A. In the Laboratory-The Spectrum of Life. New York: Harper and Row, 1970.

22. Superorganismic Relations (chapter 25, p. 205)

State Department of Education. The Source Book of Marine Sciences. Tallahassee, Florida: 1968.

23. Charting Local Current Systems (p. 15)
24. Beach Analysis (p. 23)
25. Microscopic Forms in the Sand (p. 47)

Abramoff, Pater and Thomson, Robert G. Investigations of Cells and Organisms. Englewood Cliffs, New Jersey: Prentice-Hall, Foundations of Biology Program, 1968.

26. What is the Effect of Light on Plant Growth? (exercise 48, p. 150)
27. Producers (exercise 64)
28. The Bread Mold, A Common Consumer (exercise 65, p. 207)

PROJECTS

1. Make an in-depth study of one higher bird or mammal in the South Florida area, using the population statistics of research persons. Include reproduction patterns, availability of food supply and the most serious problems that may beset this species.

2. Observe and identify in the field, at least ten specimens of birds. Point out their field identification characteristics and summarize some of the traits of each species.

3. In an open field make several "sweeps" with an insect net in a predetermined pattern. Determine how many species are present, and make a rough estimate as to the comparison of numbers of at least five species.

4. Sketch in an outline map of Florida some of the major geological formations with elevations (when possible) using the necessary Department of Agriculture bulletins.

5. Using the appropriate topographic maps, trace the Kissimmee River watershed and determine the amount of land within its drainage from the Lake of Kissimmee to the entrance of the river into Lake Okeechobee.

6. Using a Miami 1:250,000 quadrangle topographic map, make a cross section profile extending from Miami to Naples, along the Tamiami Trail. Notice the elevations at every five miles, and determine where the deepest water in the glades should be, and where "dry" land should emerge.

7. Set up one or a series of milliacre (10' x 10') plots and make population counts of a variety of weeds and seedlings. If possible, align five or six plots across a Melaleuca hammock from periphery to periphery and determine which direction the greatest seedling number is extending.

8. Establish a milliacre plot from the water edge up the bank of a canal and make a population count of the different vegetation present. Repeat this count after seven or eight weeks and record any differences that occur.

9. Make a list of some of the limiting factors that effect, specifically, the population results in projects seven and eight. Also, discuss the competition, particularly of broad leaf seedlings.

10. Scrape away completely all plant growth in a four square foot area in some spot where muck or peat is the prominent soil. Pull all root systems. Develop a flow diagram sequence of the advance of the plants on the edges of this cleared area. What are some of the characteristics of the different types of vegetation making inroads on the cleared area?

11. Locate a pine tree and observe the developing cones and the means by which the pine seeds are dispersed. Make a detailed study of the different types of pine cones and the unusual traits of several of them.

12. Determine the immobility factor of a culture of Protista by subjecting them to a 1 percent, 3 percent, and 5 percent solution of salt water. Count the time it takes for 50 percent immobility of the organisms. Graph the results and explain the results with relation to osmotic values and pressure.

13. Make a collection at three foot intervals, of approximately $\frac{1}{2}$ liter of sand scooped up in a jar from the low tide level to the established vegetation species above the high tide line. In the laboratory, carefully sort through each collection and preserve any specimens found (4 percent formalin solution). Classify the specimens and notice how far each specimen ranges along the line of collected samples.

14. Develop sketches of the carbon-hydrogen-oxygen and the nitrogen cycle, substituting for the general phases of each cycle, the actual specimens found in certain biomes.

15. Make a detailed systematic study of one particular animal in a given location, i.e., insect, small mammal, entrapped fish, or nesting bird. List some of the obvious habits that appear; rate of motion, its range and distance traveled in a particular time, the value plants apparently play in relation to its existence, its eating habits and other pertinent necessities.

16. In a small aquarium, attempt to gradually change fresh water fish to a salt water habitat by slowly adding salt water over a period of time. Keep a record of the volume of salt and fresh water balance. What amount is the limiting factor on specific species? How would this study be related to the estuarian ecology during periods of heavy rain and drought?

17. Make a nematode trap and collect specimens from a variety of locations close to plant roots in very wet, medium damp, damp and dry areas. Does the graphing of numbers of collected species indicate anything as to their range of tolerance and preferable location of habitat?

REPORTS AND DISCUSSION QUESTIONS

1. What is meant by "distribution" of plants and animals? What are some of the factors that establish patterns of distribution?

2. There are many types of soils and under each top layer of soil there are different types of horizons. What are some examples of soil horizons and why may they differ?

3. Soil particle size may differ because of its origin and exposure to the varied environment. How is soil particle size classified and what are some of the characteristics of different types?

4. Water is a necessity for plant and animal growth. How could porosity be important to the amount of water that is retained or lost in different types of soil?

5. What is the "water table" and how can the underlying layers of geological strata be responsible for establishing the depth of the water table?

6. How does a spring form? What is necessary in the geological strata for a spring to develop?

7. What are the specific kinds of specialists that deal with research in an overall ecological program concerning an area such as South Florida? How is the work of each of these people important to the overall ecology?

8. What is meant by "magnitude of springs"? What are some of the larger springs in Florida? In the United States?

9. What are some of the specific problems that would arise in the established ecology if a road were built, without culverts, across a gradual flow of water, such as is found in the Everglades?

10. What significance would the wind patterns of a general location have on the seedlings that grow from a central group of seed trees?

11. How in turn would this effect the population of insects, birds, and other terrestrial life?

12. What would be some of the results of a severe cyclonic storm such as a hurricane crossing through an established climax community; if the bird population were decimated; if severe flooding occured for some length of time; if the climax trees were leveled?

13. How are alligators important in maintaining, to a degree, a small amount of surface water during times of drought?

14. What are some of the successive steps of flora and fauna development that might logically occur from an open water ecology of a small pond to a higher climax community such as a sawgrass area?

15. What are some of the conditions that might occur in a pine and/or oak climax community over a period of two or three years to create a high density squirrel population?

16. What are some of the influences of agriculture on established communities in the basic water ecology? Consider insect eradication and fertilizers of various citrus crops; spraying for water hyacinth congestion, and others.

17. What are some of the conditions that allow a grassland prairie to remain as such? What would some of the competitive infringement species be in relation to causing any change in this community?

18. Discuss the life cycle of the common fresh and salt water mosquito. Explain why "cycles" of population concentration occur relevant to rain and temperature cycles.

19. What is meant by a population bloom, particularly in an equatic medium? What are some factors that contribute to these rapid changes of numbers of particular species? How could this natural occurence be demonstrated in the laboratory and studied with the aid of a microscope?

20. What is meant when one speaks of a stream or sea line meandering? How could severe meandering, such as occurs during unusual weather conditions, upset an established population of flora and fauna?

21. What are some of the conditions in an estuary that, to some degree, support organisms that might not be found in totally pure ocean or fresh water? Why are estuary areas so productive as spawning grounds and growing areas for young organisms?

22. What are some of the basic characteristics common to general taxonomy? Given a series of collected organisms from the seashore, what are some particular morphological characteristics that would separate individuals according to phyla and class?

23. Organize particular examples of some of the more common food chains. How does the elimination of each phase effect the link above and below the particular stage?

24. Discuss characteristics and individuals that are examples of 1) symbiosis, 2) mutualism, 3) parasitism, 4) scavengers and other similar relationships, found in nature.

FILMS AVAILABLE FROM DADE COUNTY AUDIOVISUAL CENTER

1. Animal Life Cycle
   1-30539, 28' C

2. Animals With Backbones
   EJS 1-02821, 11' BW

3. Beach and Sea Animals
   EJS 1-02664, 11' BW

4. Biologists in a Tropical Laboratory
   EJS 1-02189, 12' BW

5. Birds and Their Characteristics
   EJS 1-02892, 11' C

6. Birds of a Florida Marsh
   EJS 1-11196, 14' C

7. Birth of a Florida Key
   EJS 1-12252, 18' C

8. Enchanted Key, The
   1-02947, 10' C

9. Florida
   EJS 1-04911, 10' C

10. Florida Alligator, The
    PEJS 1-02885, 6' C

11. Florida River, A, Its Wild Life
    EJS 1-04923, 11' C

12. Geography of the Southern States
    EJS 1-04882, 11' BW

13. Insect Foods
    EJS 1-11153, 14' C

14. Mosquito, The
    EJ 1-02794, 11' BW

15. Ocean Tides - Bay of Fundy
EJS 1-10972, 14' BW

16. Operation Hurricane
EJS 1-11417, 14' BW

17. Origin of Weather
EJS 1-30376, 26' BW

18. Plant Reproduction
S 1-30649, 28' C, BW

19. Realm of the Wild
EJS 1-30686, 30' C

20. Regulation of Growth
S 1-30469, 28' C, BW

21. Reptiles and their Characteristics
EJS 1-02865, 11' C

22. Restless Sea, The, Part 1
JS 1-30369, 30' C

23. Restless Sea, The, Part 2
JS 1-30371, 30' C

24. Royal Birds of Florida
EJS 1-02978, 10' C

25. Science of the Sea
JS 1-00183, 19' C

26. Sea Turtles of Florida
JS 1-04501, 14' C

27. Seed Dispersal
JS 1-02293, 11' BW

28. Shellfishing
EJS 1-03930, 11' BW

29. Sponges and Coelenterates
JS 1-02172, 11' BW

30. Water Birds
EJS 1-30705, 32' C

31. Waves on Water
EJS 1-10987, 16' C

FILM STRIPS

1. Life in Relation to Environment, SVE Film Strips, A469-1.
2. Life in the Forests, SVE Film Strips, A469-2.
3. Life in Two Subtropical Communities, SVE Film Strips, A469-3.
4. Life in Grasslands and Prairies, SVE Film Strips, A469-4.
5. Life in a Sand Dune Succession, SVE Film Strips, A469-5.
6. Life in a Fallen Log Microcommunity, A469-8, SVE Film Strips.
7. Life in the Oceans, Filmstrip of the Month Club.
8. Forest Fires, Kinds, Causes, Cost, and Control, SVE Film Strip.
9. The Animal Kingdom, Insects, Part VI, Life Filmstrip Series.
10. Biological Societies, Filmstrip of the Month Club.
11. Biological Clocks, Filmstrip of the Month Club
12. Introduction to the Microscope, SVE Film Strips, A448-1.
13. Our Ocean of Air, SVE Film Strips, A427-6.
14. The Air About Us, SVE Film Strip, A427-6
15. Photoperiodism in Animals, Filmstrip of the Month Club
16. Populations and Food, Filmstrip of the Month Club
17. How Hormones Regulate Plant Growth, A Popular Science Filmstrip, McGraw Hill, 171726
18. Animal Communication, Filmstrip of the Month Club.
19. Animal Navigation, Popular Science Publishing Co., 1961.
20. Life in the Soil, Filmstrip of the Month Club.
21. Symbiosis, Strange Partners in Nature, A LIFE Filmstrip.

FIELD TRIPS

1. Audubon Society Field Trips
2. Fairchild Gardens
3. Serpentarium
4. Anhinga Trail Tour, Everglades National Park
5. Corkscrew Swamp Sanctuary
6. John Pennecamp Park

GUEST SPEAKERS

1. Management Personnel of Fish and Wildlife Biological Management Personnel
2. Personnel of Fish and Wildlife Law Enforcement
3. Personnel of Department of Agriculture Extension Department
4. State Geologists
5. South Florida Flood Control District Personnel
6. Evergaldes National Park Rangers and Guides

REFERENCES

1. Allee, W. C. and Schmidt, Karl P. Ecological Animal Geography. New York: John Wiley and Sons, Inc., 1951.

2. Biological Sciences Curriculum Study. Biological Science: An Inquiry Into Life. New York: Harcourt Brace and World, 1968.

3. Biological Sciences Curriculum Study. Biological Science: Molecules to Man, 2nd. ed. Boston: Houghton Mifflin Company, 1968.

4. Biological Sciences Curriculum Study. High School Biology: BSCS Green Version, 2nd. ed. Chicago: Rand McNally and Company, 1968.

5. Borror, Donald J., Delong, Dwight, M. An Introduction to the Study of Insects. New York: Rinehart and Co., 1960.

6. BSCS Green Version Laboratory and Field Investigations. Biological Science. Chicago: Rand McNally and Company, 1963.

7. Carson, Rachel. The Edge of the Sea. New York: New American Library, Times-Mirror, 1955.

8. Carson, Rachel. Silent Spring. Greenwich, Conn: Fawcett Publications, Inc., 1967.

9. Carson, Rachel, Under the Sea Wind. New York: New American Library, Times-Mirror, 1941.

10. Dade County Public Schools. Ecology and Natural History of South Florida, Experimental Curriculum Bulletin 8B-2, Miami, Fla.: 1970.

11. DeWard, John E. What Insect is That? Middletown, Conn.: American Educational Publications, 1969.

12. Dice, Lee R. Natural Communities. Ann Arbor: University of Michigan Press, 1952.

13. Ferguson, Lingham, Love, and Vernon. Tallahassee, Florida: State of Florida Department of Conservation, Geological Bulletin 31. 1947.

14. Gunter, H. Elevations in Florida, Geological Bulletin 32. Tallahassee: Department of Conservation, Florida Geological Survey, 1948.

15. International Oceanographic Foundation. Sea Frontiers. Miami, Florida: University of Miami Monthly Volumes.

16. Jacques, H. E. How to Know the Insects. Debuque, Iowa: Wm. C. Brown Company, 1947.

17. Jensen and Kavaljian, Plant Biology Today. Belmont, California: Wadsworth Publishing Co., Inc., 1966.

18. Kenner, W. E. Maps Showing Depths of Selected Lakes in Florida. Tallahassee: Florida Geological Survey, 1964.

19. LaMotte Chemical Products Co., Educational Products Division. pH, Buffers and Acid-Base Titrations. Chestertown, Maryland.

20. Leighty, Gallatin, Malcolm and Smity. Soil Associations of Dade County, Fla. Gainesville, Fla.: University of Florida Agricultural Experiment Station, Circular S-77A, 1965.

21. Maxwell, Lewis, D. Florida Insects. Tampa, Fla.: Lewis S. Maxwell, Publisher, 1965.

22. Milliken, Hammer, McDonald. Field Study Manual for Outdoor Learning. Minneapolis, Minn.: Burgess Publishing Co., 1968.

23. Needham and Needham. A Guide to the Study of Fresh Water Biology. San Francisco: Holden-Day, Inc., 1962.

24. Odum, Eugene P. Fundamentals of Ecology. Philadelphia and London: W. B. Saunders Co., 1961.

25. Phillips, Edwin A. Field Ecology. BSCS Laboratory Block, Boston: D. C. Heath and Co., 1964.

26. Pramer, David. Life in the Soil. A BSCS Laboratory Block, Boston: D. C. Heath and Co., 1965.

27. Schroeder, Klein, and Hoy. Biscayne Aquifer of Dade and Broward Counties, Florida. Tallahassee, Florida: Florida Geological Survey, 1958.

28. Simpson, G. and Beck, W. Life: An Introduction to Biology. New York: Harcourt, Brace and World, Inc., 1967.

29. Smith, Leighty, Caldwell, Carlisle, Thompson and Mathews. Principal Soil Areas of Florida. Gainesville, Fla.: Florida Agricultural Experiment Stations in Cooperation with the U. S. D. A. Bulletin 717, 1967.

30. State Department of Education. The Source Book of Marine Sciences. Tallahassee, Fla.: 1968.

31. Vorhis, Robert. Geology and Ground Water of the Fort Lauderdale Area, Investigation 6. Tallahassee, Fla.: Florida Geological Survey, 1948.

32. Zim, Herbert S. A Guide to Everglades National Park and Florida Keys. New York: Golden Press, 1960.

MATERIALS LIST

1. 5 copies, Carter, Dr. Logan S. Experiments in Soil Science, California State Polytechnic College, San Luis Obispo, California, 1968.
2. 5 copies, BSCS Blue Version Lab Manual, Houghton Mifflin Co., Boston, 1963.
3. 5 copies, Green Version Lab Manual, Rand McNally and Co., N.Y., 1964.
4. 4 copies, Milliken, Margaret; Hammer, Austin; McDonald, Ernest; Field Study Manual for Outdoor Learning, Burgess Publishing Co., Minneapolis, Minn., 1968.
5. 5 copies, The Source Book of Marine Sciences. Tallahassee, Fla. State Department of Education, 1968.
6. 5 copies, Abramoff, Peter and Thomson, Robert G., Investigations of Cells and Organisms, Prentice-Hall, Foundations of Biology Program, Englewood Cliffs, New Jersey, 1968.
7. 5 copies, Ecology and Natural History of South Florida, Experimental Curriculum Bulletin number 8B-2, Dade County Public Schools, Miami, Florida, 1970.
8. 2 copies, Allee, W. C. and Schmidt, Karl P., Ecological Animal Geography, John Wiley and Sons, New York, 1966.
9. 5 copies, Buffaloe, Neal D., Animal and Plant Diversity, Prentice-Hall Foundations of Biology Program, Englewood, Cliffs, New Jersey, 1968.
10. 5 copies, Odum, Eugene, Fundamentals of Ecology, W. B. Sunders, Co. Philadelphia, Pa., 1961.
11. 2 copies, Dice, Lee R., Natural Communities, University of Michigan Press, Ann Arbor, 1952.
12. 5 copies, Jacques, H. W., How to Know theInsects, Debuque, Iowa, William Brown and Co., 1947.
13. 5 copies, Phillips, Edwin A., Field Ecology, BSCS Lab Block, Boston, Mass., D. C. Heath and Co., 1964.
14. 5 copies, Needham and Needham, A Guide to the Study of Fresh Water Biology, San Francisco, Cal., Holden-Day Inc., 1962.
15. 5 copies, Prame, David, Life in the Soil, A BSCS Lab Block, Boston: D. C. Heath and Co., 1965.
16. 12 microscopes, depression slides, cover slips
17. 1 Sudbury Soil Testing Kit
18. Seines and Plankton Tow Nets, variety, Optional
19. Variety of U. S. Topographic Contour Maps, U. S. Geodetic Survey, Washington, D. C.

MASTER SHEET--ECOLOGY OF TERRESTRIAL SPECIES OF SOUTH FLORIDA

Objective	Readings	Experiments	Films	Film Strips	Reports/Discussion Questions	Projects
1	#29. pp. 5-64 #18. pp. 5-40 #13. pp. 5-178 #21. pp. 3-115 #32. pp. 4-25	11,12,23,24	4,16,25	1,12	7,9,16	1,2,6,9
2	#29. pp. 5-64 #31. pp. 5-55 #18. pp. 5-40 #20. circular	1,2,3,4,5,6,7,8,9,10,11	7,8,9,11,12	1,3,15	1,2,3,4,5,6,8,9,16 20	4,5,6
3	#18. pp. 5-40 #13. pp. 5-178 #32. pp. 8,14	4,5,6,14,18,21,22	3,6,11,12	1,10,14	4,5,6,8,9,12,13,14,16,18,20	3,4,5,6,8,9,14
4	#24. pp. 235-237 #24. pp. 266-272 #24. pp. 150-157 #25. pp. 32-50 #22. pp. 65-78 #12. pp. 27-79	4,15,17,18,26	4,18,20	1,2,3,6,8,16,20,21	1,2,4,9,10,11,12,13,14,19	3,7,8,9,10,11,17
5	#24. pp. 257-287 # 4. pp. 92-94 # 2. pp. 700-706	7,8,10,11,17	1,7,8,12	1,2,8,16,20,21	1,4,5,9,12,14	7,8,9,10,13,16
6	#24. pp. 260-266 #24. pp. 104-144 #10. p. 16	15,16,17,22,26	11,12,16,17,18,20	1,2,3,4,6,16	1,4,9,10,11,12,15,16	2,7,8,9,10,11,12,15
7	#24. pp. 104-144	5,8,17,19,21	11,12,16,17,20	1,2,3,4,6,8,16	1,2,3,4,9,12,17	2,3,10,11,15,17
8	# 6. pp. 155-184 #24. pp. 88-144 #28. pp. 83-89, 321-322	12,13,14	3,7,8,22,23,25	1,7,10,15,21	1,5,16,18,19,20,21,22,23	12,13,14,15,16
9	#24. pp. 328-366 #30. pp. 9-151	21,22,23,24,25,26,27	1,2,3,4,8,15,16,22,23,25,26	1,7,11,15,16,21	1,12,16,18,19,20,21,22	13,15,16
10	#24. pp. 62-68, 88,148,48-55, 372-376,10-26 # 2. pp. 686-737 #28. pp. 642-645	14,15,16,17,18,19,20,21,22,26,27,28	1,2,3,5,6,10,13,14,19,21,24,26	1,6,10,11,13,14,15,16,17,18,19,20,21	19,21,22,23,24	2,3,14,15,16,17